Claims

1. Method for use in an equalization of a channel by means of an equalizer (22,23), wherein said channel uses a certain frequency band for a transfer of signals, said method comprising:
   - determining a channel response for at least one frequency point within said frequency band used by said channel; and
   - setting at least one adjustable coefficient (φ_{0k}, $b_{ck}, b_{rk}, a_{0k}, a_{1k}, a_{2k}$) of said equalizer (22,23) such that an equalizer response compensates optimally the determined channel response at said at least one selected frequency point.

2. Method according to claim 1, wherein determining said channel response comprises determining a channel phase response and a channel amplitude response for said channel, and wherein said coefficients ($\varphi_{0k}, b_{ck}, b_{rk}, a_{0k}, a_{1k}, a_{2k}$) of said equalizer (22,23) are set such that an equalizer amplitude response approaches optimally the inverse of the determined channel amplitude response for all considered frequency points and that an equalizer phase response approaches optimally the negative of the determined channel phase response all considered frequency points.

3. Method according to claim 1 or 2, further comprising selecting the number of said at least one frequency point for said channel to correspond to the minimum

number which can be expected to result in a sufficient channel equalization.

4. Method according to claim 3, wherein said number of said at least one frequency point is selected for said channel data block-wise based on frequency domain channel estimates for said channel.

5. Method according to one of the preceding claims, wherein in case said at least one frequency point comprises one frequency point, setting said adjustable coefficients comprises for an equalization of the phase of said channel setting a complex coefficient ($e^{j\varphi_{ok}}$) of a phase rotator part (31) of said equalizer (22,23).

6. Method according to one of the preceding claims, wherein in case said at least one frequency point comprises one frequency point, setting said adjustable coefficients comprises for an equalization of the amplitude of said channel setting a real scaling amplification factor.

7. Method according to one of the preceding claims, wherein in case said at least one frequency point comprises two frequency points, setting said adjustable coefficients comprises for an equalization of the phase of said channel setting a complex coefficient ($e^{j\varphi_{ok}}$) as a phase rotator part of said equalizer (22,23) and setting at least one coefficient (b_{ck}) of a complex allpass filter part (30) of said equalizer (22,23).

8. Method according to one of the preceding claims, wherein in case said at least one frequency point comprises two frequency points, setting said adjustable coefficients comprises for an equalization of the amplitude of said channel setting at least one coefficient (a_{0k},a_{1k}) of a symmetric 3-tap Finite Impulse Response filter part of said equalizer (22,23).

9. Method according to one of the preceding claims, wherein in case said at least one frequency point comprises three frequency points, setting said adjustable coefficients comprises for an equalization of the phase of said channel setting a complex coefficient ($e^{j\varphi_{ok}}$) as a phase rotator part of said equalizer (22,23), setting at least one coefficient (b_{ck}) of a complex allpass filter part (30) of said equalizer (22,23), and setting at least one coefficient (b_{rk}) of a real allpass filter part (33) of said equalizer (22,23).

10. Method according to one of the preceding claims, wherein in case said at least one frequency point comprises three frequency points, setting said adjustable coefficients comprises for an equalization of the amplitude of said channel setting at least one coefficient (a_0,a_1,a_2) of a symmetric 5-tap Finite Impulse Response filter part (34) of said equalizer (22,23).

11. Use of the method according to one of claims 1 to 10 for a single channel of a single carrier system.

12. Use of the method according to one of claims 1 to 10 for each of a plurality of sub-channels of a filter bank based multicarrier system or of a transform based multicarrier system.

13. Use of the method according to one of claims 1 to 10 for each of a plurality of sub-channels of a filter bank based multiantenna system or of a transform based multiantenna system in a Multiple Input Multiple Output configuration.

14. Use of the method according to one of claims 1 to 10 for channels which are to be processed in an analysis-synthesis filter bank configuration.

15. Signal processing device (2) comprising:
    - at least one equalizer (22,23) associated to a channel using a certain frequency band for a transfer of signals, which at least one equalizer (22,23) comprises at least one adjustable coefficient; and
    - a channel estimation component (24) adapted to determine for at least one channel to which said at least one equalizer (22,23) is associated a channel response for at least one frequency point within a frequency band used by said at least one channel, and adapted to set at least one adjustable coefficient of said at least one equalizer (22,23) such that an equalizer response compensates optimally the determined channel response at said at least one frequency point.

16. Signal processing device (2) according to claim 15, wherein said channel estimation component (24) is

adapted to determine as said channel response for said at least one channel a channel phase response and a channel amplitude response, and to set said coefficients (φ_{0k}, b_{ck}, b_{rk}, a_{0k}, a_{1k}, a_{2k}) of said equalizer (22,23) such that an equalizer amplitude response approaches optimally the inverse of a determined channel amplitude response for all considered frequency points and that an equalizer phase response approaches optimally the negative of a determined channel phase response for all considered frequency points.

17. Signal processing device (2) according to claim 15 or 16, wherein said channel estimation component (24) is further adapted to select the number of said at least one frequency point for said at least one channel such that it corresponds to the minimum number which can be expected to result in a sufficient channel equalization.

18. Signal processing device (2) according to claim 17, wherein said channel estimation component (24) is adapted to select said number of said at least one frequency point for said at least one channel data block-wise based on frequency domain channel estimates for said at least one channel.

19. Signal processing device (2) according to one of claims 15 to 18, wherein in case said at least one frequency point comprises one frequency point, said at least one equalizer (22,23) comprises for an equalization of the phase of said at least one channel a phase rotator part with an adjustable

complex coefficient ($e^{j\varphi_{0k}}$) which is adapted to be set by said channel estimation component (24).

20. Signal processing device (2) according to one of claims 15 to 18, wherein in case said at least one frequency point comprises one frequency point, said at least one equalizer (22,23) comprises for an equalization of the amplitude of said at least one channel an adjustable real scaling amplification factor.

21. Signal processing device (2) according to one of claims 15 to 20, wherein in case said at least one frequency point comprises two frequency points, said at least one equalizer (22,23) comprises for an equalization of the phase of said at least one channel a phase rotator part with an adjustable complex coefficient ($e^{j\varphi_{0k}}$) which is adapted to be set by said channel estimation component (24) and a complex allpass filter part (30) with at least one coefficient (b_{ck}) which is adapted to be set by said channel estimation component (24).

22. Signal processing device (2) according to one of claims 15 to 21, wherein in case said at least one frequency point comprises two frequency points, said at least one equalizer (22,23) comprises for an equalization of the amplitude of said at least one channel a symmetric 3-tap Finite Impulse Response filter part with at least one coefficient (a_{0k}, a_{1k}) which is adapted to be set by said channel estimation component (24).

23. Signal processing device (2) according to one of claims 15 to 22, wherein in case said at least one frequency point comprises three frequency points, said at least one equalizer (22,23) comprises for an equalization of the phase of said at least one channel a phase rotator part with an adjustable complex coefficient ($e^{j\varphi_{0k}}$) which is adapted to be set by said channel estimation component (24), a complex allpass filter part (30) with at least one coefficient (b_{ck}) which is adapted to be set by said channel estimation component (24), and a real allpass filter part (33) with at least one coefficient (b_{rk}) which is adapted to be set by said channel estimation component (24).

24. Signal processing device (2) according to one of claims 15 to 23, wherein in case said at least one frequency point comprises three frequency points, said at least one equalizer (22,23) comprises for an equalization of the amplitude of said at least one channel a symmetric 5-tap Finite Impulse Response filter part (34) with at least one coefficient (a_{0k}, a_{1k}, a_{2k}) which is adapted to be set by said channel estimation component (24).

25. Signal processing device (2) according to one of claims 15 to 24, wherein said at least one equalizer is a single equalizer adapted to equalize a single channel of a single carrier system.

26. Signal processing device (2) according to one of claims 15 to 24, wherein said at least one equalizer comprises a plurality of equalizers (22,23), each adapted to equalize another one of a plurality of

sub-channels of a filter bank based multicarrier system or of a transform based multicarrier system.

27. Signal processing device (2) according to one of claims 15 to 24, wherein said at least one equalizer comprises a plurality of equalizers, and wherein a respective matrix of equalizers is adapted to equalize another one of a plurality of sub-channels of a filter bank based multiantenna system or of a transform based multiantenna system in a Multiple Input Multiple Output configuration.

28. Signal processing device (2) according to one of claims 15 to 24 comprising an analysis-synthesis filter bank, wherein said at least one equalizer comprises a plurality of equalizers (22,23), each adapted to equalize another one of a plurality of sub-channels which are to be processed by said analysis-synthesis filter bank.

29. Signal processing system comprising a signal processing device (2) with:
    - at least one equalizer (22,23) associated to a channel using a certain frequency band for a transfer of signals, which at least one equalizer (22,23) comprises at least one adjustable coefficient; and
    - a channel estimation component (24) adapted to determine for at least one channel to which said at least one equalizer (22,23) is associated a channel response for at least one frequency point within a frequency band used by said at least one channel, and adapted to set at least one adjustable coefficient of said at least one

equalizer (22,23) such that an equalizer response compensates optimally the determined channel response at said at least one selected frequency point.

30. Signal processing system according to claim 29, wherein said channel estimation component (24) is adapted to determine as said channel response for said at least one channel a channel phase response and a channel amplitude response, and to set said coefficients (φ_{0k}, b_{ck}, b_{rk}, a_{0k}, a_{1k}, a_{2k}) of said equalizer (22,23) such that an equalizer amplitude response approaches optimally the inverse of a determined channel amplitude response for all considered frequency points and that an equalizer phase response approaches optimally the negative of a determined channel phase response for all considered frequency points.

31. Signal processing system according to claim 29 or 30, wherein said channel estimation component (24) is further adapted to select the number of said at least one frequency point for said at least one channel such that it corresponds to the minimum number which can be expected to result in a sufficient channel equalization.

32. Signal processing system according to claim 31, wherein said channel estimation component (24) is adapted to select said number of said at least one frequency point for said at least one channel data block-wise based on frequency domain channel estimates for said at least one channel.

33. Signal processing system according to one of claims 29 to 32, wherein in case said at least one frequency point comprises one frequency point, said at least one equalizer (22,23) comprises for an equalization of the phase of said at least one channel a phase rotator part with an adjustable complex coefficient ($e^{j\varphi_{ok}}$) which is adapted to be set by said channel estimation component (24).

34. Signal processing system according to one of claims 29 to 32, wherein in case said at least one frequency point comprises one frequency point, said at least one equalizer (22,23) comprises for an equalization of the amplitude of said at least one channel an adjustable real scaling amplification factor.

35. Signal processing system according to one of claims 29 to 34, wherein in case said at least one frequency point comprises two frequency points, said at least one equalizer (22,23) comprises for an equalization of the phase of said at least one channel a phase rotator part (31) with an adjustable complex coefficient ($e^{j\varphi_{ok}}$) which is adapted to be set by said channel estimation component (24) and a complex allpass filter part (30) with at least one coefficient (b_{ck}) which is adapted to be set by said channel estimation component (24).

36. Signal processing system according to one of claims 29 to 35, wherein in case said at least one frequency point comprises two frequency points, said at least one equalizer (22,23) comprises for an equalization of the amplitude of said at least one channel a symmetric 3-tap Finite Impulse Response filter part

with at least one coefficient (a_{0k}, a_{1k}) which is adapted to be set by said channel estimation component (24).

37. Signal processing system according to one of claims 29 to 36, wherein in case said at least one frequency point comprises three frequency points, said at least one equalizer (22,23) comprises for an equalization of the phase of said at least one channel a phase rotator part (31) with an adjustable complex coefficient ($e^{j\varphi_{ok}}$) which is adapted to be set by said channel estimation component (24), a complex allpass filter part (30) with at least one coefficient (b_{ck}) which is adapted to be set by said channel estimation component (24), and a real allpass filter part (33) with at least one coefficient (b_{rk}) which is adapted to be set by said channel estimation component (24).

38. Signal processing system according to one of claims 29 to 37, wherein in case said at least one frequency point comprises three frequency points, said at least one equalizer (22,23) comprises for an equalization of the amplitude of said at least one channel a symmetric 5-tap Finite Impulse Response filter part (34) with at least one coefficient (a_{0k},a_{1k},a_{2k}) which is adapted to be set by said channel estimation component (24).

39. Signal processing system according to one of claims 29 to 38, wherein said system is a single carrier system and wherein said at least one equalizer is a single equalizer adapted to equalize a single channel.

40. Signal processing system according to one of claims 29 to 38, wherein said system is a filter bank based multicarrier system and wherein said at least one equalizer comprises a plurality of equalizers (22,23), each adapted to equalize another one of a plurality of sub-channels of said filter bank based multicarrier system.

41. Signal processing system according to one of claims 29 to 38, wherein said system is a filter bank based or transform based multiantenna system in a Multiple Input Multiple Output configuration, wherein said at least one equalizer comprises a plurality of equalizers, and wherein a respective matrix of equalizers is adapted to equalize another one of a plurality of sub-channels of said filter bank based or transform based multiantenna system.

42. Signal processing system according to one of claims 29 to 38, wherein said system is an analysis-synthesis filter bank system, wherein said at least one equalizer comprises a plurality of equalizers (22,23), each adapted to equalize another one of a plurality of sub-channels which are to be processed by said analysis-synthesis filter bank system.

43. A software program product in which a software code for use in an equalization of a channel by means of an equalizer (22,23) is stored, wherein said channel uses a certain frequency band for a transfer of signals, said software code realizing the following steps when running in a signal processing device (2) comprising said equalizer (22, 23):

- determining a channel response for at least one frequency point within said frequency band used by said channel; and
- setting at least one adjustable coefficient (φ_{0k}, $b_{ck}, b_{rk}, a_{0k}, a_{1k}, a_{2k}$) of said equalizer (22,23) such that an equalizer response compensates optimally the determined channel response at said at least one selected frequency point.